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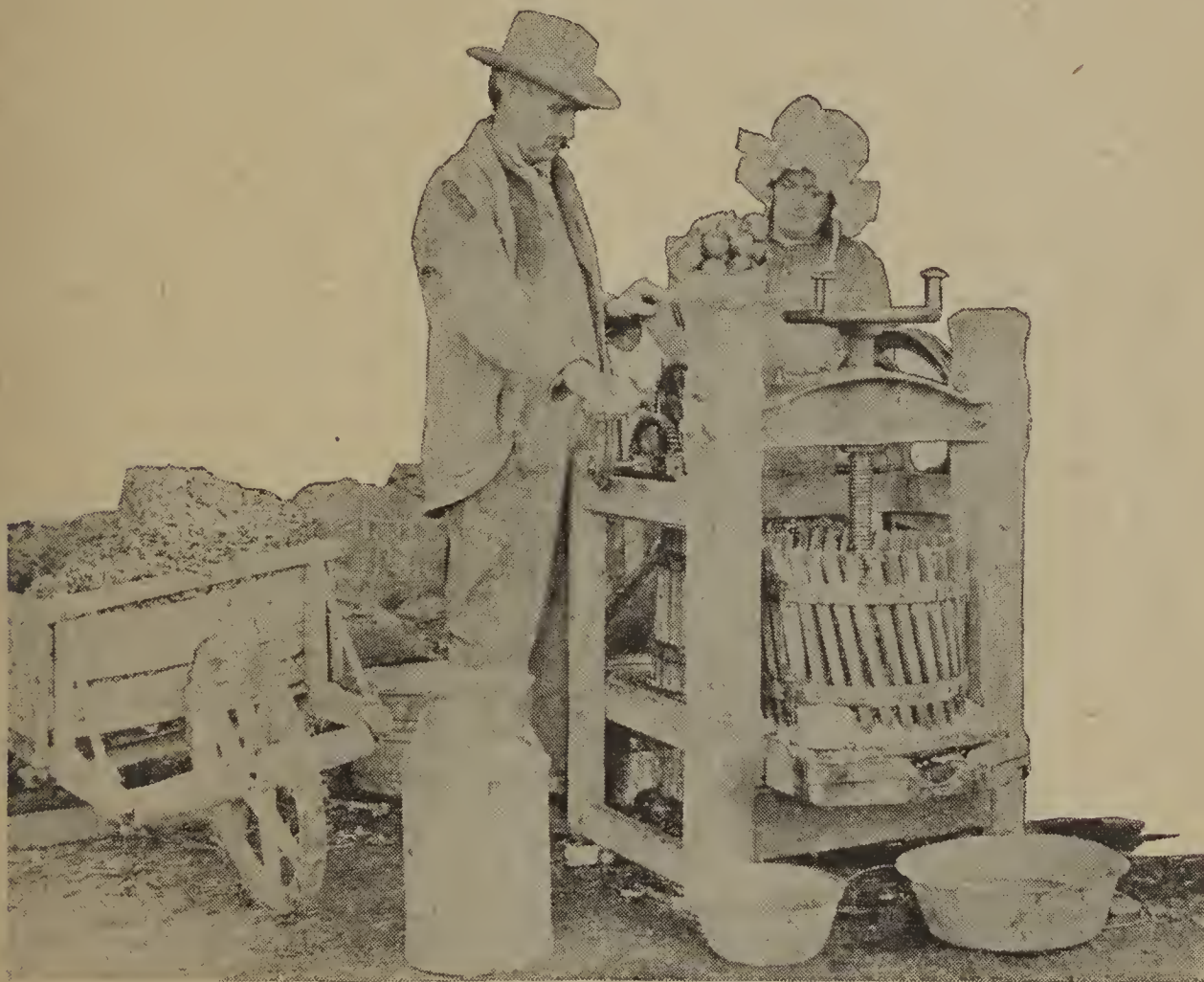
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COOPERATIVE EXTENSION WORK IN AGRICULTURE AND HOME ECONOMICS

United States Department of Agriculture and State  
Agricultural Colleges Cooperating

# MAKING VINEGAR IN THE HOME



Office of Extension Work South, States Relations Service

VINEGAR MAKING from waste fruits and juice of the sugar cane or other material naturally containing sufficient sugar for fermentation has been carried on for a number of years in many homes in the South. Sometimes these home-made vinegars have not succeeded as well as at other times, and the home demonstration agents have been asked for reliable information for producing a uniform standard product. In response to this demand and in order to minimize the amount of fruit, cultivated and wild, which now annually is wasted, this circular has been prepared.

Any fruit which contains fermentable sugar in sufficient quantity may be used for the production of vinegar. Many wild fruits, such as blackberries, elderberries, and persimmons, which are frequently not completely or properly utilized, will make excellent vinegar.

This circular describes simple and inexpensive methods for making vinegar from fruits in the home. We believe it will prove of special value to all who are interested in the very practical problems of household economy and also be of interest to those who have in mind the broader problems of food conservation.



# MAKING VINEGAR IN THE HOME

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## TO COUNTY HOME DEMONSTRATION AGENTS:

The information given in this circular was furnished by L. A. Round and Edwin LeFevre of the Bureau of Chemistry.

The circular gives directions for making vinegar on a small scale for household use. The same principles apply to the manufacture of vinegar on a commercial scale, but different methods and apparatus are employed in handling large quantities.

## THE PROCESS

Vinegar making as ordinarily practiced is an exceedingly simple process. The fermentation is allowed to proceed without any attention. The changes, however, which the juice undergoes are very complex. The first changes are characterized by bubbling and foaming, the so-called "working," brought about by yeasts that find their way into the juice from the air and fruit. The activity of these yeasts converts the sugar in the fruit juice into alcohol. After the alcoholic fermentation is complete, acetic bacteria begin to grow and change the alcohol into acetic acid or vinegar. These bacteria grow on the surface of the liquid and form a film or scum called "mother." After a time this film becomes so heavy that it sinks and a new film forms. This continues until the alcohol is all converted into vinegar, and, if not stopped, until the acetic acid is destroyed and the vinegar "turns to water."

Vinegar is usually made from apples, although grapes and oranges are also used to some extent. Certain other fruits, also, such as mayhaws (*Crataegus* sp.), blackberries, figs, peaches, watermelons (after concentration of the juice), sorghum, cane sirup, etc., have been used with good results. As a matter of fact, with proper handling, any wholesome fruit or vegetable juice can be used satisfactorily for vinegar making, provided it contains sufficient sugar. Some fruits, such as guava, Kieffer pears, etc., contain only 5 to 8 per cent of sugar, which is not sufficient to make a strong, satisfactory vinegar.

The fruit used for making vinegar should be sound and fully ripe. Partially decayed fruit is no better for vinegar making than for eating and should not be used. Fruits, when ripe, contain more sugar than when green or underripe, and consequently produce a stronger vinegar.

For these reasons select sound, ripe fruit. Wash thoroughly and

remove all decayed portions. Crush either in a machine made for this purpose, such as a cider mill or, for small quantities, run through a food chopper. Squeeze out the juice in a press and put into a *clean* barrel, keg or crock for fermentation. Great care should be taken to have all the utensils *thoroughly clean* and to handle the fruit in a cleanly manner. If old kegs or barrels, especially old vinegar barrels, are used, they should be cleansed thoroughly and all traces of the old vinegar removed. If this is not done, the old vinegar will interfere with the alcoholic fermentation and possibly spoil the product. After the juice has been squeezed out, add a fresh yeast cake to every 5 gallons of the juice. A good fermentation often results from chance inoculation with the wild yeasts of the air. This is the method ordinarily followed in making cider vinegar. Experiments have shown, however, that a much stronger vinegar can be made by using yeast to start the fermentation. Work the yeast up thoroughly in about one-half cup of the juice, and add to the expressed juice, stirring thoroughly. Cover with a cloth to keep insects away and allow to ferment. The best temperature for fermentation is between 80° and 90° F. Do not put in a cold cellar as is the custom in many localities or the fermentation will be too slow. At 80° to 90° F. alcoholic fermentation will usually be complete in from 3 to 4 days to a week, in other words, "working" stops, as indicated by the cessation of bubbling. The next step in the process is acetic acid fermentation during which the alcohol is changed into acetic acid.

It is probable that in some cases still better results can be obtained by pasteurizing the juice before adding the yeast. The juice is pasteurized by heating to 150° to 160° F. and allowing to cool to 90° F. before adding the yeast.

After the active alcoholic fermentation (bubbling) stops, it will be found advantageous to add some good, strong, fresh vinegar in the proportion of 1 gallon of vinegar to 3 or 4 gallons of fermented juice. Usually in making vinegar on the farm or in the home, no vinegar is added. Inoculation of the fermented juice with acetic acid bacteria is left to chance. Usually chance inoculation produces a more or less satisfactory product. Sometimes, however, the product is far from satisfactory and must be thrown away. It "never turns to vinegar." If vinegar is added, the results are much more satisfactory.

Instead of the vinegar one can add a good quantity of the so-called "mother." If "mother" is used, however, one should use only that growing on the surface of the vinegar and not that which has gone to the bottom. Vinegar mother which has fallen to the bottom is no longer producing acetic acid. After a time it becomes changed in nature and should not be used. Use good, strong vinegar instead.



After adding the vinegar, cover with a cloth and keep in a dark place between 70° and 90° F., preferably at 80° to 85° F. Do not disturb the film that forms, for this is the true mother, the acetic acid bacteria which turn the fermented juice to vinegar. Do not exclude the air. The acetic acid bacteria must have air for growth. Taste the juice every week and when it ceases to increase in acid, or is as sour as desired, siphon off and store in kegs, jugs, or bottles, filled full and stoppered tight. If this is not done, the acid will gradually disappear and the vinegar will "turn to water." The same bacteria that produce the acid also destroy it if allowed to grow unhindered. If stored in well stoppered, full receptacles, this can not happen for the absence of air prevents this change. After bottling, some high-grade vinegars are pasteurized (heated to 160° F. for 15 minutes) in order to prevent subsequent clouding.

If the directions are followed, especially as regards temperature, the process will usually be completed in six weeks to two months in cases where only a few gallons of juice are used.

Many fruit juices are turbid after fermentation, while others, particularly apple vinegar, may clarify themselves spontaneously. These juices which remain cloudy and turbid must be clarified to make a nice appearing product. A common method is to store the vinegar in barrels undisturbed for a considerable time and then "rack off," i. e., draw off carefully so as not to disturb the sediment. This is repeated several times and usually gives a fairly clear product.

For a very clear product several types of filtration are used, one of the simplest of which for household purposes, especially in clarifying vinegar for fancy packs, is to thoroughly mix about a tablespoonful of fuller's earth or animal charcoal with a quart of the vinegar and filter through filter paper. The charcoal also tends to remove the color as well as the turbidity and makes a dark-colored vinegar more satisfactory for fancy packs. The animal charcoal and filter paper can be obtained from any drug store.

High-grade vinegars are usually put through a process of "fining" as it is called to further clarify them and give them as much sparkle as possible. This is done by the use of isinglass as follows: Isinglass is cut into small pieces and soaked for 12 to 24 hours in a little water containing acetic or tartaric acid equal in weight to the isinglass used. When thoroughly soft it is then rubbed several times through a fine sieve, gradually adding a little more water until a perfectly fluid liquid is obtained. This fluid is then well mixed with a little vinegar and thoroughly stirred into the cask. With some vinegars it is necessary to add a little tannin, from one-half to one-seventh the amount of the isinglass used. This tannin should be added at least 24 hours before the finings.

## FRUITS FOR VINEGAR MAKING

Apples, grapes, and oranges usually contain sufficient sugar to make a satisfactory vinegar. Some apples, however, notably the "sweet" apple does not.

**Blackberries** (usually) are said to be satisfactory.

**Pineapples** contain sufficient sugar and make a vinegar giving a very delicious flavor of pineapple.

**Watermelons** also make an excellent vinegar, but the juice must be concentrated to about one-half its original volume to give a sufficient concentration of sugar. Such concentration would be impracticable on a household scale.

**Peaches** usually contain sufficient sugar and produce a vinegar with a strong aroma of peaches. Follow special directions given below for crushing and pressing peaches.

**Sorghum and cane sirup.** Follow special directions.

**Figs** are used to some extent in the South and produce a good vinegar. Water, of course, must be added and the amount should be regulated by the use of a saccharometer as described under sorghum vinegar.

**Mayhaws** are also used in the South. Water must be added as in the case of figs.

It is also common practice with many people to make vinegar from fruit parings and cores, cold tea, and even from the water in which potatoes or other vegetables are boiled. Sugar of course is added just as in the case of fruit juices that do not contain sufficient sugar. The vinegar is made from the added sugar. The other things added give a desirable color and necessary food material for the yeasts and bacteria.

## PEACH VINEGAR

Vinegar can be made successfully from waste peaches, i. e., peaches which would otherwise be allowed to decay. This vinegar has not only a high percentage of acetic acid, but also a very pleasing aroma of fresh peaches. For vinegar making peaches should be mellow, but no decayed portions should be added. The peaches should also be tree ripened, if possible, for tree ripened peaches apparently contain more sugar than those removed from the tree while green and allowed to ripen during shipment or storage.

Peaches contain a large amount of gums which interfere with pressing. For this reason they should be fermented, pulp and all, and the juice squeezed out afterward. The alcohol produced by the yeast during the first fermentation precipitates the gums and so no difficulty will be experienced in pressing.

Crush the peaches as thoroughly as possible with a potato masher or a maul. The stones need not be removed. With clingstones the removal of the stones would be out of the question. Inoculate with the yeast (one yeast cake to a bushel of peaches) just as described above and allow to ferment for three or four days. Stir the mass every day to prevent molding. The fermentation will soften the pulp, especially that clinging to the pits in clingstones and a larger quantity of juice will be secured. After 3 or 4 days' fermentation squeeze out the juice and allow fermentation to



be completed, i. e., wait until bubbling stops and then strain and add vinegar as described under general directions for vinegar making.

It will be found that practically all fruit will give a higher yield of vinegar if they are crushed and fermented, pulp and all, as described for peaches.

### SORGHUM AND CANE SIRUP VINEGAR

The sugar in both sorghum and cane sirup is different from that found in fruits. This sugar is called sucrose, or cane sugar; and is not fermentable by ordinary bread yeast. If this sugar remained as sucrose, the addition of a yeast cake would not aid in the fermentation. As soon as pressed out, changes begin to take place in the juice, which changes the sugar into the fermentable type. In concentrating, the heat stops this action. Even in this case, however, the addition of baker's yeast can do no harm and may be beneficial.

The fresh juice as expressed from sugar cane and sorghum usually contains enough sugar to give a good strong vinegar, if properly handled. If fresh juice is used, do not pasteurize, for this will stop the changing of the sucrose to fermentable sugar. Add baker's yeast as described and follow the general directions.

In making sorghum sirup a considerable loss is encountered in the "skimmings" which are often thrown away. A similar loss is experienced in boiling down cane sirup. To get the best results in these cases, one should adjust the amount of sugar in the waste by means of a saccharometer, or jelly spindle, so that it contains between 12 and 15 per cent of sugar. If more than this amount of sugar is present, the vinegar will be too strong. If much below, it will be too weak. After adjusting to the proper reading by adding water, cover with a cloth and set aside. Allow to ferment and after active fermentation (bubbling) is over, follow the methods given under general directions for vinegar making.

No information is available to show whether the addition of baker's yeast in this case is advantageous or not. It would at least do no harm and might possibly improve the product.

### TOMATO VINEGAR

In attempting to utilize the tomato in as many ways as possible, it is not uncommon practice, especially with "Tomato Club" girls, to make what is termed "tomato vinegar." This product is not a vinegar, although it has a sour taste and to a certain extent, as in salads and for table purposes, can be used as a substitute for vinegar. It is really a lactic acid fermentation instead of acetic acid, and for this reason is more like sour milk and sauerkraut juice. It spoils rapidly after fermentation, unless it is put into bottles, filled as full as possible and corked tight. After opening and exposure to the air, the product will spoil unless kept very cold.

In making this product the juice is collected and allowed to stand in a warm place for a few days. After it becomes sour it should be filtered or strained and stored in bottles, filled full and corked tight.

There appears to be no reason why such a product could not be used in salad and meat dressings, etc., with entire satisfaction.

## DON'TS

1. Don't put the freshly pressed juice into old vinegar kegs or barrels without thoroughly cleansing and scalding. (If, however, the barrels have a protective coating of rosin and paraffin on the inside, do not scald, for hot water will remove the coating.) Old barrels with vinegar in them or the addition of vinegar directly to the fresh fruit will prevent it from ever making vinegar.

2. Don't add "mother" to freshly pressed juice. It will spoil the juice for vinegar making. Add surface mother *only after alcoholic fermentation (bubbling) has ceased*.

3. Don't add old "mother" from the bottom of an old vinegar barrel. Add only "mother" from the surface and good strong vinegar.

4. Don't put in a cold cellar. Fermentation will either be entirely prevented or it will be very slow, sometimes continuing for two years.

5. Don't store in full barrels and expect it to make vinegar. Barrels and kegs should be filled half full and laid on sides. Holes should be bored in each head just above the juice and the bung left open to give circulation of air. Cover holes with cloth to keep insects away.

6. Don't put in too warm a place or expose to sunlight in summer to hasten fermentation. It may prevent it. The best temperature is between 80° and 90° F.

7. Don't, after adding vinegar, expose to bright light. It may prevent acetic acid bacteria from growing.

8. Don't, after vinegar is made, leave it exposed to the air. The acid will gradually disappear and it will "turn to water."

9. Don't, if unsuccessful, think your "cellar won't make good vinegar." Either the fruit did not contain enough sugar, or you, unconsciously, perhaps, failed to follow some important step in the directions. Even in vinegar making "practice makes perfect."

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